

### **Remarks**

This amendment is being submitted in response to the first Office Action dated June 27, 2006 in connection with the above-captioned application. Appropriate late fees are separately addressed in attached documents. The Office Action has been carefully reviewed. The following response is offered in an attempt to advance claims 1-16 to allowance. Reconsideration and early allowance of all pending claims in light of the following Amendments and Remarks is courteously requested.

Claims 1, 14 and 16 have been amended to incorporate a variety of important characteristics emphasized in the text of the specification and claims. The crystalline structure described in Claim 14 has been incorporated into Claim 1. Claim 1 has also been put in a clearer step form.

Claim 14 has been amended to incorporate the exothermic reaction described in the specification on page 4 at line 25 and formation of hydrated products as described in the specification on page 4 at line 14.

Claim 16 has been amended to cover protection against "bleeding" described in the specification on page 4 at lines 25-31.

### **The Invention**

The invention is directed towards complete immobilization and solidification of nitrate or nitrite in aqueous waste, where the nitrates and nitrites form a crystalline structure within the solid.

### **Claim Rejections – 35 U.S.C. § 112**

Applicant has substituted "the aqueous waste" for "the waste", as suggested by the Examiner. Pore structure and solid structure from Claim 14 have been inserted into Claim 1. These changes should resolve all 35 U.S.C. § 112 issues.

### **Claim Rejections – 35 U.S.C. § 102**

Claims 1 and 7-16 are rejected as being anticipated by Snyder et al. U.S. 5,640,704 under 35 U.S.C. § 102. Snyder et al. in Column 2, line 12 teaches "superior immobilization and solidification of the various potentially harmful species ..." by use of a complexant compound, but does not teach or suggest any of the materials/reactants set forth in step (a).

As shown in the Abstract of Snyder et al., a cementous grout is produced, and the solutions containing soluble salts, such as nitrates and nitrides are merely occluded within the pore structure of the grout. So, the term solidification refers to the formation of a bulk solid; it does not refer to the conversion of the nitrate and nitrite salts themselves to solids. That is why the Abstract discusses curing and solidification. It is referring to the cementing reactions not to the conversion of nitrate and nitrite compounds to solids. The hydrated iron oxide, e.g.  $\text{Fe}(\text{OH})_3$ , referred to is a “complexant”. What this means is that it is present to allow adsorption of any radioactive species that might be present, and especially dissolved uranium, onto the surface of the iron compounds. Claim 1 does not recite any of these familiar processes.

Snyder et al. column 3, lines 49-55 relates to complexation by hydrated iron oxide. This does not teach the method of claims 1 and 7-16, because the claims do not relate to the use of complexation (e.g. adsorption within a microporous hydroxide structure) or of hydrated iron oxides. Amended claim 1 is not taught by Snyder et al ‘704 which relates to cement solidification technology.

Claim 14 is rejected based on col. 4, lines 1-9, however this text is directed towards fixation of radionuclides such as uranium onto the hydrated iron oxide which is produced from iron sulfate, column 3, line 65. Again there is no teaching of claim 14, which is directed towards the immobilization of nitrate and nitrite, and exothermic reactions.

Claim 16 is not taught by Snyder et al, since the amended claim recites protection against formation of solution droplets on the exterior surface of the solid not seen in Snyder et al..

There is no teaching of the claims based on Snyder et al as the present claims do not recite a heavy metal species or a radioactive species for immobilization. The claims do not recite a complexant, the claims do not recite a grout, the claims do not recite curing. The use of applicants compound,  $3\text{ME}(\text{II})\text{O}\cdot\text{R}_2\text{O}_3\cdot\text{Me}(\text{II})(\text{NO}_x)_2\cdot n\text{H}_2\text{O}$ , is neither shown directly by Snyder et al nor can it be inferred from any of those claims or examples.

Claims 7-13 and 15 are not asserted as independently contributing to patentability over Snyder et al apart from their dependency on amended claim 1. Applicants respectfully submit amended claims 1-16 are not anticipated by Snyder et al.

### **Claim Rejections – 35 U.S.C. § 103**

Claims 2-16 are rejected as obvious as unpatentable over Snyder et al. in view of Barney et al. U.S. 4,028,265. The Examiner concedes that Snyder et al. does not teach the sodium of applicants claims 2-6. The Examiner states Barney et al. discloses sodium as sodium nitrate in the Abstract. The Abstract states sodium nitrate as the problem, and the process described in Barney et al. is an attempt to form solid insoluble products, by reaction at 30°C to 100°C, followed by air drying to form bricks which are fired at 600°C, to form a solid mineral.

Applicant's claims 2, 3, 4, 5 and 6 each separately recite reaction of  $3\text{ME(II)O} \cdot \text{R}_2\text{O}_3 \cdot \text{Me(II)(NO}_x)_2 \cdot n\text{H}_2\text{O}$ . This does not contain silica, is not an aluminosilicate, and is not derived from clay. It is understood that it is desirable to immobilize nitrate from sodium nitrate but stating the problem is not seen as inferring a solution to the problem, as is claimed separately by applicant's claims 2, 3, 4, 5 and 6. As to Barney et al. column 2, lines 15-20 applicant, in none of the claims immobilize nitrate or nitrite using cancrinite nor do the claims 2, 3, 4, 5 and 6 recite clays.

Regarding Claim 14, Snyder et al. does not suggest immobilization of nitrate and nitrite. Regarding Claim 16, Snyder et al. does not suggest protection against formation of solution droplets on the exterior surface of the solid, as discussed previously. Neither amended claim 14 or 16 are made obvious by the combination of Snyder et al. '704 and Barney et al. '265.

Claims 7-13 and 15 are not asserted as independently contributing to patentability over Snyder et al. in combination with Barney et al apart from their dependency on amended claim 1.

### **Other Art Not Cited**

Applicant notes art made of record (Noakes U.S. 5,269,975; Matsuda et al. U.S. 5,498,828 and Pierce et al. U.S. 5,960,368), considered by the Examiner, but not applied in the rejection of any claims. Amended claim 1, upon which all other claims are dependent requires solidifying an aqueous waste admixture containing, in part, nitrate ions or nitrite ions, where the admixture also contains selected ME(II) and R groups, which admixture is solidified to provide a porous solid structure and immobilize the aqueous nitrate or aqueous nitrite. Noakes teaches solidification in cement for transport and storage in solid form by casting and curing. Matsuda et al. teaches waste

solidification with a solidification agent to provide insoluble materials. Pierce et al. teaches nitric and phosphoric acid addition to waste at up to 210°C and then encasing in a phosphate ceramic or glass. None of these patents are seen as supplying what the cited references lack to make any of applicant's amended claims either anticipated or obvious.

**Summary**

All outstanding issues are believed to have been addressed. In view of the foregoing amendments and arguments, Applicant respectfully submits that claims 1-16 are in condition for allowance; and Applicant respectfully requests reconsideration and allowance of those claims. However, any suggestion by the Examiner as to deletion or modification of claim language to present allowable subject matter, would be appreciated.

Respectfully submitted,

A handwritten signature in black ink that reads "Daniel P. Cillo". The signature is written in a cursive, flowing style.

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